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EDUCATIONAL MONOGRAPHS

PUBLISHED BY THE

NEW YORK COLLEGE FOR THE TRAINING OF TEACHERS

NICHOLAS MURRAY BUTLER, EDITOR

VOL. III. No. 3. { Entered at the Post Office at New York City as second class matter. } WHOLE No. 15.

MANUAL TRAINING IN FRANCE

BY

A. SALICIS
Late Inspector General of Manual Training

Suggestions for the TEACHING OF COLOR

BY

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MAY, 1890

NEW YORK: 9 UNIVERSITY PLACE
LONDON: THOMAS LAURIE, 28 PATERNOSTER ROW

ISSUED BI-MONTHLY [$1.00 PER ANNUM

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PREFATORY NOTE.

The manuscript for the paper which follows on Manual Training in France, was placed in the hands of the editor by Gustave Adolphe Salicis but a few weeks before his death in December last. A sketch of M. Salicis' life and educational activity was published by the New York College for the Training of Teachers as Leaflet No. 51.

The translation has been carefully made by Benjamin D. Woodward, Instructor in the Romance Languages in Columbia College.

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Manual Training in France.

Nature wishes that those who work should first be esteemed and rewarded by the measure of their salary.—CONFUCIUS.

I have always noticed that among workmen, good apprentices make good citizens.
—B. FRANKLIN,
(Codicil to his testament.)

We have been created to act and to produce.—CHANNING.

The aim of education should be to prepare us for complete life; therefore education should furnish the individual with the means of providing for his existence.
—HERBERT SPENCER.

There is nothing at all new in the idea of completing man and doubling his value by teaching him at an early age to make use of his hands. We have reason to be astonished at not finding a greater number of manual instructors, and also that no country has thought best to introduce into its public schools the use of the HAND, the simplest, cheapest, most universal, most obedient and most marvelous tool in our possession.

If we stop to think of the sum of the countless efforts of all kinds that have been spent since the formation of society solely on the unfolding of brain powers, it might prove interesting to consider what would be the present state of the world if the millionth part of this outlay in mind and money had been appropriated to create and make fruitful in successive generations a love for concrete work in all its forms—a love such as would be called forth, fostered and promoted by bringing about an appreciative coöperation between the taste and the judgment, the eye and the hand.

In this connection the following quotation from Channing is generally known, in the United States at least: "Manual training is a school where men are put to acquire energy of purpose and of character, a conquest which is far more valuable than all the knowledge of the schools."

Not less familiar are the opinions of Pestalozzi, Condorcet, Rousseau, Locke, and Montaigne, all of whom would surely agree with the English philosopher in saying, "since it cannot be hoped that a child will have time and strength to learn everything, the result is that he should be taught especially those branches of which he is most in need, and which will be of greatest and most frequent use to him in the world."

Already in his day Seneca complains that this was not the case: and this inconsistency must be strikingly apparent, for Détrouve himself, whose mind was radically different from that of the Seneca, has thought it his duty to say in his *Satyricon*:—

"Those who are in charge of the studies of young people do not devote sufficient care to make them familiar with what is most intimately connected with every-day life; thus it happens that when they do breathe the atmosphere of the surroundings among which their destiny calls them, they believe they have been wafted into a different world."

For many centuries there has been no great change in the education of those classes whose livelihood depends on the daily work of their hands. It would seem as though the book or the paper were the only things they would have to handle, and as though the pen were the sole tool they would have to make use of. Book, pen, and paper are put into the hands of children from their fifth to their thirteenth year, and they submit during all this time with passive indifference to being saturated with the one taste for literary things. Then, when they have been carefully perverted both intellectually and physically with respect to the future which awaits them and when the gate of life finally stands wide open before them, they are calmly expected to enter it not only unarmed but wholly unprepared.

Does this mean that the actual primary instruction

should be slashed to pieces, and that one excess should be substituted for another? What rash voice could formulate such an idea? By no means, for every nation has its main roots buried in the mass of elementary knowledge. If it be in the nature of things that we children of the same country are called upon to follow different paths, we may at least have the same language, write it in the same way, and share the same history. However, if the introduction of manual labor become general, let no one scorn the tools, the needles, the scissors, which we all shall have learned to handle. On the contrary let each one esteem modesty and courage in their attempts to lead a creditable and useful life.

Far then from wishing to weaken primary instruction, I believe it can be conceived of as strengthened, but different: it would be reduced perhaps by half as a time for study, but in return a double harvest would be reaped by thinning out the requirments, very much in the same way as a forest is cleared in order to strengthen its trees. The new departure would consist chiefly in introducing into the new system concrete methods of instruction, revealing such principles as can be assimilated on the spot, and yielding such results as will be useful later on.

This is in part the aim sought by the Academy of Medicine in the active war it is waging against intellectual over-pressure. This is moreover the tendency, clearly defined nowadays in France, as well among the guardians of public instruction as in the legislative halls and in the general enlightened opinion of the country.

It was in March, 1882 that the Chamber of Deputies voted in favor of making manual training obligatory for the different grades of primary instruction. Thus was realized in a much larger sense the scheme which Condorcet laid before the Convention nearly a century ago, and which the strong heads of the time naturally dubbed

Utopia; it was spoken of as Condorcet's Utopia! Very happily this is the way with a goodly number of Utopias; to-day they are follies in the sight of barren scepticism, and to-morrow they are fruitfully fulfilled.

Up to 1882, manual training was not altogether wanting in France; but where it did exist, it was chiefly in the form of apprenticeship, or rather of undivided preparation for one special calling. The institutions offering this training bore the characteristic names of apprentice's schools, industrial schools, technical schools, schools of arts and trades, and so on. These institutions were private corporations; their number was very limited and they could not give to their pupils the general stamp which is inherent in a nationally ordered instruction.

Beginning at the very foundation, and in keeping with the spirit of the law, the State has organized and is still busied in organizing, institutions which are *primary* above all; just as are those whose fundamental principles are the book and the pen. The State should no more aim to turn out accomplished workmen after a course in simple manual training, than it claims to graduate thirteen-year old literati and historians on a pen and book instruction. But just as it ought to provide the pupils as far as possible with the knowledge necessary to spell their language correctly and also with the elements of a tolerable style, just so in manual courses it can spread a knowledge of the correct use of the principal tools and of the ordinary operations with them.

Given a child's nature, nothing else is needed in order to develop there the pre-existent germ which stimulates him to realization: he can then be roused to a taste for work, and this is the inevitable outcome of training an underlying skill. The whole secret is here: underlying skill, disclosure of tendencies, taste for work.

Far from being well under way in 1882 with this worthy end in view, all preparations for the journey had

still to be made ; methods, buildings, stock of tools, body of instructors,—all this coupled to the great obstacle that on making the new studies obligatory, it had been forgotten to make any appropriation for them.

Thanks however to the stand taken by M. Jules Ferry, Minister of Public Instruction, and by M. Buisson, Director of Primary Instruction, a Special Normal School for Manual Training was decided on and was straightway created. Admission by competition was granted to forty-eight young school-teachers, graduates of the Université de France. They were taught there for one year the following branches :—

1. Experimental physics and chemistry as illustrated in simple phenomena, i. e., such experiments as might be repeated in elementary schools ; the instruction was collective but the students had the privilege of individual manipulation.
2. Natural history, treated in the same way.
3. Plane trigonometry, algebra, and elementary mechanics.
4. Descriptive geometry with direct applications to perspective and to stereotomy.
5. Drawing, modeling, moulding, and graphic designing.
6. Treatment of wood at bench and turning-lathe.
7. Treatment of iron in the smithery, with vice and turning-lathe.
8. As subordinate studies ; choral music, French literature, fencing, and fire practice.

This programme was to be completed at a later period by a scientific study of various fertilizers in their relation to the nature of the soil and to special productions. Repeated quizzes, competitive reviews, and practical trials kept these young teachers always on the alert. Although the programme was overcrowded for immediate needs, it was thoroughly carried out, and was satisfactorily assimilated in all its parts.

From an essentially manual point of view it covered about the following ground :

Stereotomy : Design and construction of a soffit, of a full centre, of a segmental arch, of a stilted arch, of a rampant arch ; development of the same ; stringer of a staircase.

Drawing and Modeling : Rendering of twelve models selected from the collection of the National School of Fine Arts. No modeling was done, unless preceded or followed by a design of the object.

Joinery : Besides preliminaries, twenty exercises in joining and ten summaries.

Smithery : Introductory details, fire-building, striking in presence of one, two, and three smiths, welding, rolling, measuring the calibre, tempering.

Millwright's work : Practice in flat and half-round files, mortise-chisel, graver, saw.

Wood turning-lathe : Railings of different styles, Médicis vase.

Metal turning-lathe : Slide cylinder.

Every object made was to be a material rendering of an off-hand sketch. A memorandum of each sketch was entered in a special workshop note-book, along with the teacher's private explanations and estimates.

The close of the year witnessed the establishment of a certificate of proficiency for such as were fit to teach manual work in the normal schools and in the higher primary schools. On examination this certificate was awarded to most of the students in the first promotion : the few backward ones obtained this distinction in the following year, along with twenty-four new students of the second promotion.

The Special School has thus graduated seventy-two professors of manual training : since then, the normal school in St. Cloud has swelled the list by a few adepts, and some independent teachers have shown themselves

so well versed in the several requirements as to pass satisfactory examinations in the same. Thus it is that now, in strict compliance with the law, each one of our ninety normal schools, including Corsica and Algeria, is provided with a competent professor of manual training. On the other hand these schools are fully equipped with laboratories, workshops, and tools: with respect to the new branches, the programme is identical with the one adopted by the Special Normal School, minus the above-mentioned 3rd, 4th, and the latter part of 8th. The course is completed within three years at the rate of four hours per week, a rate which seems very inadequate.

Still these normal schools are beginning now to graduate every year something like 1500 teachers, who are pretty well fitted to introduce the new studies in the numerous continuation schools. The outlook for the elementary schools is also bright, and it may be hoped that they will delay no longer in incorporating special teachers in their body of instructors. Summer schools are even being opened gradually in the normal schools to those teachers in each department who will pledge themselves to regular attendance. These voluntary teachers carry back to their schools a manual knowledge which is sufficient inasmuch as it is primary: their own works are their models and their note-book is their guide. The remainder of their equipment, which in the beginning need be only slight in the way of buildings and tools, will depend altogether on the General Councils and on the Municipalities.

In fifteen years from now, nearly all our primary high schools and most of our 40,000 elementary schools for boys ought to provide our 2,750,000 male children of the working-classes with the instruction which will fit them completely for the future they have in store.[1]

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[1] If we do not speak of the girls, it is because they have already to a certain extent a suitable *primary* manual training, consisting of needlework, cutting out, and dressmaking.

This period of expectation would have been shortened, and the standard of manual training would surely have been raised, if the Special Normal School for Manual Training, founded by M. J. Ferry, had been developed instead of suppressed by his second successor; unfortunately, ministers have this point in common with the days,—they follow upon one another without being alike.

It is a fact that everywhere, without exception, where the equipment is decent and the professor suitable, manual training is as much of an attraction to the pupils of various ages as to the student-teachers of the normal schools. The recent convention of academical rectors and of general inspectors of primary instruction, presided over by the Minister, was unanimous in favor of the new departure: such was the interest manifested by the students of the normal schools, that at times it had even been necessary to restrict their enthusiasm in workshop matters. We wish it to be always well borne in mind that we are dealing here only with the question of *primary* manual training, such as is generally given by the State.

Inasmuch as the variety of private enterprises is as great as the number of individual callings, it is not to be expected that their soul and mechanism should emanate from the government. In this case, it is a matter as we have already stated of regions, departments, cities, industrial syndicates or private concerns. These special and varied demands have for some time been met in France by a large number of private establishments. The last few years have seen them well started towards rapid enlargement, and the organization of syndicates can only hasten their development.

Heretofore the State was satisfied with providing a few important typical institutions, such as the National Schools of Arts and Trades which were founded long ago in Châlons, Aix, and Angers. The experiment is to be completed by trial district-schools in Vierzon, Voiron, and

Armentières. These schools, like the former ones, will receive boarders and will give instruction from the primary department up to a well-defined idea of the industrial occupations of the country.

The rapid spread of general manual training is greatly hampered by the lack of space available in primary schools and moreover by a temporary scarcity of the department and communal funds. Great sacrifices have been required and made in view of building local railroads, town-halls and school-houses, and, as is always the case, noble impulses have been followed to the detriment of future welfare. Nevertheless, besides these primary high schools which are being equipped day by day, there is a very large number of elementary schools which have now introduced manual training in various stages. At all events the difficulties have been diminished, in a measure, by the programmes adopted by the High Council of Public Instruction, small classes being assigned such work as requires neither workshop nor special equipment.

For the time being and awaiting further reforms, manual work enters under the head of physical education. A synopsis of the same is as follows :—

BOYS.

5—7 Years.	7—9 Years.	9—11 Years.	11—13 Years.
Easy exercises in plaiting, folding, and weaving. Cutting out pieces of colored paper and uniting them in geometric designs. Easy basket-work. Combinations of colored worsteds on canvas or on paper.	Development of dexterity. Construction of geometric solids out of paste-board. Basket-work, combinations of many colored twigs. Modeling. Reproduction of geometric solids and of very simple objects.	Wooden slips adorned with painted pictures and colored paper. Easy wire-work; trellis-work. Combination of wire and wood-work; cages. Modeling simple architectural ornaments. Facts about the most common tools.	Combined exercises in drawing and modeling. Objects sketched on a given scale and vice-versa—objects reproduced from a sketch on a given scale. Chief tools used in wood-work. Graduated exercises. Planing, sawing wood, simple joinery. Boxes, nailed or put together without joints. Turning-lathe. Turning very simple objects. Chief tools used in iron-work. File exercises, paring or polishing rough pig-iron and cast-iron.

GIRLS.

5—7 Years.	7—9 Years.	9—11 Years.	11—13 Years.
Easy Froebel exercises. Plaiting, folding, weaving. Knitting small articles.	Knitting and study of the stitch. Meshes on the right and wrong sides. Ribbed work, increasing, diminishing. Making stitch, on canvas. Elements of sewing. Hems and overcastings. Manual exercises to develop dexterity. Cutting out and joining colored paper. Easy trials in modeling.	Knitting and taking up loose stitches. Marking on canvas, forward stitch, side stitch, back stitch. Overcasting-stitch. Plain seam, hem; double seam. Overcastings on selvedge. Overcastings on turned in folds. Towels, napkins, handkerchiefs, aprons, shirts: piecing.	Knitting skirts, jackets, mittens. Marking on linen. Stitching, gathers, buttonholes. Mending garments, darning. Elements of cutting and making up very simple garments. Elements of domestic economy in its relation to the kitchen, to washing clothes and keeping them in repair, to the toilet, to household duties, to the garden, and to the poultry-yard.

Such is nowadays in France the part which manual training plays in elementary schools. This programme may be altered to meet the wants of any and every school, and in such a way that each school can select a part of the whole in keeping with its means. In any case the Council of every department is vested with a certain authority in matters of changes such as it may seem wise to bring about in local applications of manual training.

A committee has recently been formed with the mission of studying up the question of agricultural training in normal schools, primary high schools, and elementary schools.

Personally we do not think that the type of programme shown above should be maintained as a whole, at least as far as the boys are concerned.

It seems to us that up to the eleventh year there is not a sufficient demand made upon individual thought and judgment, or upon the complete subjection of the hand to an instantaneous decision of eye and will. Moreover, physical strength meets with no means or incentive to develop. Weaving, basket-work, plaiting,—all this is quiet work, where the fingers are trained to move evenly and mechanically, without any intellectual exertion. The proof of this lies in the fact that this kind of work is introduced with greatest ease in the asylums for the blind and weak-minded. We believe that the true aim of manual training should be to accustom a child at an early age to work standing, and as far as possible, to bring all parts of his body into play. Does he not do this anyway, if left to himself? Is it not a source of continual wonder to see the youngest children stand from morning to night: they are on such a constant go that it is impossible for their parents to keep up with them. And then, thanks to this healthful weariness, when night comes on they fall into a sound sleep from which they arise at early dawn refreshed and ready to begin all over again.

The needs of a child are made evident by his love for hoops, tops, ball-playing in all its phases, and so on. A child must dig ditches, build dams, climb trees, and experiment with the power of his lungs : he must do all this and in the same day. He will even skip his meals, if he has a chance.

It is very true that all this cannot be done in a school : still the natural inclinations of a child should not be tampered with, but this overflow of vital energy should be controlled in such a way as to direct the main course into a channel of future usefulness.

Thanks to the freedom of scope and means which the Municipal Council of Paris has given us, it is on these lines that we seek to promote manual training in the public school of Rue Tournefort. We lay special stress upon our methods, because this institution realizes a type whose tendency is to spread as a whole or in part.

There, all children from the ages of six and seven years have a part in active manual work. As soon as they enter school they begin modeling, and they keep up the study during their entire school course. They are also taught to treat soft wood with the saw, the rasp, the chisel, and the mortise-chisel. They are then advanced to the plane, the turning-lathe, and the iron-work including furnace duty.

At a very early age they begin to sketch on a given scale, all draughting being recorded in a note-book which is never to leave them. These memoranda are chaotic at first, but they assume rapidly a definite shape : the accounts of daily work are tabulated as regards the nature of the work, its material, and the time spent on it.

The school is made up of five classes, the highest being intended for special or post-graduate work.

12–14 years	Special	Class	devotes	21	hours	a	week	to	manual	work.	
10–12	"	1st	"	"	8⅓	"	"	"	"	"	"
9–11	"	2nd	"	"	5	"	"	"	"	"	"
8–10	"	3rd	"	"	4	"	"	"	"	"	"
7–9	"	4th	"	"	3	"	"	"	"	"	"

No attempt is made to specialize before the Special Class. Once there students are given successively finishing touches in a complete general training, but besides that, they have access to such special branches as will foster more especially an avowed bent.

The new instruction involves an additional expense of 15000 francs a year; the school receives 260 children, and were it not for its small quarters it could take in 300 without its outlay being increased other than by the expenditure for raw material.

This institution has been in operation now for nearly sixteen years, and the experiment may be considered a success from the triple point of view of hygiene, general instruction, and practical results. The children thrive notwithstanding the fact that their attendance in school is longer by two hours than the usual regulations provide. Their occupations are so varied, in accordance with their mental and physical aptitudes, that there is no sign of weariness after their exertions of mind and body. Ardor pervades them in a characteristic way: their heaviest punishment is to be debarred from the workshop.

As regards instruction, the annual examination ordeal for the certificate of proficiency in primary studies is a sufficient relative criterion: it proves that the scholars from the Rue Tournefort are among the best off, as far as scholastic knowledge is concerned. Thus, in addition to what their comrades in other schools know, they are indebted to the new instruction for all the manual training they have acquired. The practical results are made manifest in the facilities for finding good apprenticeships, for reducing their length, and for being sooner compensated.

Besides choice workmen devoted to their calling, this school has graduated expert accountants, teachers, professors even of higher branches, and artists: one of these, famous when twenty years old for his water-colors, is now much sought after by New York publishing houses.

Of the two hundred boys' schools in the city of Paris, about one-half are equipped with benches and turning-lathes, at which the older scholars do manual work. The Municipal Council and the Board of Instruction are both endowed with the very best will, and still they have not dared to settle definitely the amount of importance to be attached to primary manual training. As a consequence, this instruction is somewhat subordinate, and up to the present time the results attained are not in proportion to the sacrifices made. Another cause of delay is the lack of teachers well qualified in point of methods and *statements*. As a matter of necessity workmen are called in: they are good practical men as far as their own work goes; but when it comes to imparting knowledge, their teaching is decidedly empirical.

This state of affairs has very happily reached a climax and a sweeping change will take place: the teachers will now be recruited from the ranks of Normal School graduates of the department of the Seine.

We have stated above that nowadays all normal schools give manual instruction: the school at Auteuil especially, (Seine department), has been thoroughly equipped for the past three years and graduates every year some thirty teachers who are well able to fill to some advantage the places of present workmen.

The case will be the same in other departments in proportion to their population.

At all events the extension of manual knowledge can only be hastened still more by the decisions of the Higher Council of Public Instruction. Ministerial resolutions, and if need be, special decrees insure to these decisions a legal sanction.

In accordance with them all, every primary high school must be provided with a workshop, and there shall be awarded certificates of proficiency in higher primary studies, including manual work. These two, three, and

four year schools are urgently demanded by the departments and cities : they apply to a part of the studying population that has already received the certificate for elementary primary instruction, and that is not compelled to seek directly an apprenticeship.

Now it happens that the committee intrusted with the revision of the programme desires to retain a general course of study during the first year only in the high schools : this year should be a sort of review. Then from the second year on the studies are to become more and more professional, and are to be based chiefly on the main industries of the country. Manual training will be obligatory four hours a week during the first year, five hours in the second year, and six hours throughout the third and fourth years.

If *we* take into account that the prime elements of this training have had full chance to become assimilated in the elementary school during a minimum period of six years, *they* will surely bear fruit after an average apprenticeship of four years, or after an additional special training in the high schools.

The outlook should be a bright one for future generations, inasmuch as being better prepared to battle with life they will show greater love for work, and will be all the more happy and honored on that account.

Suggestions for the Teaching of Color.

As psychology recognizes the important part that color plays in the development of the child's mind, the delight produced by the color sensation, and the fact that external forms are more readily perceived where it exists, there seems a need of proper and systematic teaching of this subject in our schools. Just what may be done, how much, and the exact value of such teaching we cannot determine at present, but a few suggestions as to ways, means, and possibilities may, I trust, be helpful. The manner of teaching this subject of color will undoubtedly always be more or less individual, and subject to existing conditions in various localities; yet there are certain fundamental laws and principles which certainly should be understood by the teachers in our schools, however little opportunity they may have for using them. We do know to be sure that a keen, sensitive color sense is inborn, a gift to the fortunate individual, like a retentive memory, great power of speech, or a musical voice; but when we observe how savage even now is the taste of the masses, surely much may be done in quickening and guiding the national taste by judicious training. We never do anything by halves here in America. Because some "artiste" in modes in a moment of inspiration throws certain colors together, audacious in combination, possible only when arranged by a master hand, the effect softened here and there by a deft touch, straightway many of our maidens steal the audacity but miss the artistic knowledge or inspiration. Who has not suffered from the bright green

dresses recently worn, when because it was fashionable to wear flowers as a decoration, a bunch of violets or bright crimson roses often became the prominent adornment. A blonde feels that blue is her color, so with a blind freedom from all restraint as to the harmonious whole of her costume, her dress is one hue of blue, her bonnet another, with here and there several tints and shades all sounding a different key and so out of tune. A walk through any of our shops will reveal quantities of both cheap and expensive trash whose only reason to be is the popular demand for novelty. The uncultured classes both rich and poor live at an extravagant pace, and prefer show and display at the expense of good taste or comfort. Is there anything we can do in the schools to lay the foundation for something better, for lives and purposes honest and true? It is a solemn thought that the shaping of so many young lives is in our hands, for the mass of the children are in the public schools; these children are to become our citizens and through their childhood and during their school life one important function is not only to educate but in so doing to elevate.

We are all unconsciously building an American school of art. Purely national it may not be for a long time; good it will be, if artists, teachers, and industrial workers of all kinds, work for the best and put aside the bad. Let us recognize the humanizing influence of the beautiful, and strive for it, and be not overcome by the strictly useful and practical.

In our modern methods we reach the child through his senses. A young child springs toward a bright colored ball when such an object without color might pass unnoticed. This physical gladness which young children feel in the presence of color we may use to advantage in the early study of form. The use of color beyond the first years except to acquire a knowledge of its properties and its application in decorative design, must, it seems to me,

be restricted, on account of the difficulty of handling the medium, and the need of the power to draw, to see light and shade, and to express much in a few telling touches. What needs to go before really artistic expression of color from nature, is good training in drawing and modeling, with a knowledge of light, and shade, all leading up to the intelligent use of color in the really artistic sense.

There is another and important reason why children should at least know one color from another. We are told on the best of authority that color blindness is alarmingly prevalent. I will spare you the statistics which you can easily look up for yourselves, but they are startling. This is significant however, that red and green are the colors which the color blind most readily fail to distinguish; yet it so happens that these are the two colors most used for signals on railroads and ships. The cause of color blindness is in dispute, there being no apparent difference between the eyes of those who readily detect colors and those who are color blind. One thing is evident that the study of color is a possible means of developing a weak or latent color sense. With the little ones there are many ways of making the study delightful and instructive, as matching bits of woolen cloth and skeins of worsted, colored papers, silk and so on, taking great care that the color is taught before the color-name; as children who are really color blind have been known to associate the name with some special spot on a color chart, or form of material without really recognizing the color by the color sense. In order to have the same sense impressions repeated sufficiently for them to become fixed facts in the mind of the child, it seems well to deal for some time—certainly in their paper folding and cutting—with the primary colors only, and before I suggest certain ways of taking up such exercises let us consider for a little what we mean by primary colors. The scientists and artists sometimes differ in their statements as to what colors

shall be called primary. Some scientists show that red, green, and violet, are the primary colors in the spectrum; the other colors orange, yellow, and blue being made by their combination. Artists dealing with pigments find that they cannot produce yellow, red, or blue by the union of any other colors and that green, orange, and violet or purple may be made by uniting two of these first named pigments. So they decide that yellow, red, and blue are the primary colors. From these conclusions we are forced to acknowledge a spectrum basis of color, and a pigment basis. Again, there are those who contend that the primary colors are yellow, red, and blue both in the spectrum, and with pigments, and reason the subject out on this basis. In the spectrum or rainbow we see seven colors; violet and indigo being hues of blue, we can reduce the spectrum to violet, blue, green, yellow, orange, and red. As the orange comes midway between yellow and red, the green between yellow and blue, and the violet which is beside the blue partakes of the red, it may be assumed that orange is formed by a combination of red and yellow rays of light, green by rays of yellow and blue, and purple or violet by rays of blue and red. By this reasoning yellow, red, and blue are proved to be primary colors even in the spectrum. They are surely so in pigments, and as we cannot imprison the sunbeam or revel in the living colors of the sunset, we must do the best we can with the means we have at hand.

From the first we shall have to contend with the disadvantage that none of the pigments are perfectly pure, for while the union of the spectrum colors of yellow, red, and blue produces white light, the same combination with paints gives us only gray, light or dark, according to intensity.

In the school-room, for practical use and dealing with water colors, the best paints to use are gamboge, carmine, and Prussian blue with Payne's gray or neutral tint, to

make shades or dulled colors. These paints work freely, mix well and are not expensive. The proportion which the primaries bear to each other is said to be as three of yellow, five of red, and eight of blue, and we see the three primary colors either in their purity or in combination in everything we look at, which accounts in a way for the harmony of complementaries. If we look at a yellow object, such as a yellow vase or yellow drapery, we really see an effect of purple or violet in the surroundings. It is of course delicate and subtile, we may not even be conscious of it. The reason for this is that the retina of the eye becomes weary of one color and the other two primaries, red and blue, are seen in combination as a purple or violet hue which is cast in the shadows of the drapery or on some object adjacent to the vase. This may be proved to children by the coloring of discs and observing the halo which finally appears about the disc. In dealing with paints or colored papers, complementaries, such as purple and yellow, red and green, or blue and orange, are too strong in contrast to be put directly together. The effect is too harsh. It is true that they enhance each other, but except in tints or when modified by softening separations and surroundings they should not be placed in juxtaposition. It may be said, the rose is surrounded by green, oranges with their glossy leaves stand out against the deep blue of a tropical sky. This is true, but the rose is not seen as pure red, or the leaves as pure green ; the rose is modified by its light and shade, the influence of its surroundings, and by the gray of the atmosphere. Green leaves are very gray in their high lights and the shadows which are nearest to the strongest green are seen broken by bits of red, invisible perhaps to the untrained eye yet always present to the careful observer. Secondary colors are those derived from the combination of two primaries. This it is well to illustrate before the children with paints and glasses of water, or

better still the children may mix the colors and produce the results themselves. Blue and red for instance will make purple, leaving yellow, which being the remaining primary color is accordingly complementary to purple. Assuming the pigment basis always, orange, green and purple are the secondaries. The tertiaries, citrine, russet and olive (by some called gray) are those produced by the union of any two of the secondaries. Orange and green, for example, make citrine. As orange is composed of the primaries, red and yellow, and green of blue and yellow it follows that in citrine there is an excess of yellow ; consequently it demands its complementary, purple. Therefore purple is complementary to yellow and in strong contrast with it, and also complementary to citrine and in subdued contrast with it. Russet is formed by the mixture of orange and purple and as there is red in both of these secondaries, it follows that there is an excess of red in russet. So that russet is the subdued complementary of green. By the same reasoning, olive (which is so gray in tone as to be called gray by some authorities) harmonizes with orange.

These tertiary colors are the rich dull colors that we enjoy about us in home decorations such as wall-papers, draperies, carpets and the like. A bit of high color however here and there is necessary to enliven the general effect. Because tertiary colors are quiet and subdued, it does not follow that their exclusive use is desirable. Dark rooms gain much by light coloring in the decoration, and tints of tertiaries are often preferable to their full strength. An artistic sense of the fitness of things is so essential in house decoration that it is quite common at this time for those who feel that they have not had sufficient education in such matters to employ a professional decorator, who takes the matter entirely in charge, and, whether it be a room or the whole furnishing of a house, sees to it that the harmony is perfect throughout. There are those however,

ready to undertake such matters, who have little sense of beauty or fitness. "Dull colors are the fashion," they inform the customer. Straightway the change in the house begins. Much of the furniture is ebony, the wall paper is dark and all the fabrics dingy; a funereal gloom settles upon everything; the effect in fact is so depressing that the dissatisfied seeker after the æsthetic, while resigned to the situation, does hope that lively colors will be the fashion again soon.

It is affectation to admire nothing but fadè, or dulled colors, and reminds one of the expression of the young woman who undoubtedly pretended to more than she felt when asked "Is not that a lovely sunset?" answered, "Yes, but the coloring is crude." It is really much more difficult to make a good decorative design using primaries or even secondaries than to combine the subdued tertiary colors. Faults of proportion are more quickly recognized and the bright colors require great care in distribution and separation. In stained glass we get some lovely softened effects by the aid of the light which shines through. By the juxtaposition of red and blue for example the light softening and yet brightening the colors, a purple bloom results and great richness of effect. The nearer we can use color in its purity the better, but it takes a master hand to make the arrangement artistic and tasteful. Egyptians, Greeks, Arabs, and Moors used primary colors almost entirely during the earliest and best periods of their art. In the periods of decadence, red and green are found side by side where before were red and blue. In Pompeii every variety of shade and tone was employed but the bright colors were different and probably duller than the chemical colors of to-day.

In the High School (if not before) the study of Historic Ornament may include color, not only by the rendering of decorative designs of special periods but also in studying the people of those periods, their history and their

architecture. The Egyptians expressed color in a conventional manner. It was usually in flat tints and good examples may now be seen on some of the carefully preserved mummy cases. Many of their colors were very resinous which in part accounts for their remarkable preservation. There is interest and profit in the study of the art of any people, whether it be the efforts of the untutored savage or the expression of high poetic thought, with all the added advantage of technical excellence.

The perspective of color is sometimes made use of in decoration, so that certain impressions almost of relief may be produced. They are vague to be sure, and thus all the more charming. This is done by bringing forward the advancing colors and placing in the background the retreating. The advancing colors are red, orange, and yellow, and the blues the retreating. The ancients seemed to possess great knowledge of the resources of color and their mutual relations. The Chinese, while showing no real grandeur in any of their treatment, have the richest of coloring. This is also true of Japanese Art, which has more beauty and individuality than the Chinese.

There is much that we can work out in the theory of color, which is not only delightful and instructive in the doing but also helpful in decorative art and even in fine art, but we must never forget that color, with all its mystic influences, its subtile harmonies, and even discords cannot be sounded by plummet, nor can combinations at once agreeable to the sense and elevating to the mind be reduced to an algebraic formula. We find by experience not only in teaching but in art work generally that some knowledge of theory is of great value, but while accepting certain facts we must not forget that conditions modify them, and that in teaching color, as with many other things, there are exceptions to rules and various influences to be considered. Such are sunlight, light and shade, proximity of other colors, &c. &c., all of which have much

meaning. In our teaching of color in the public schools, water colors are cleaner and more easily handled than other color mediums, and more satisfactory in results. Both water colors and oils are greatly affected by their grinding. In old times every artist ground his own colors, or if he felt his time too precious the colors were ground by a boy in the studio. Many of the greatest artists began in this way as color grinders in some studio. The old masters kept their colors in pots and bladders and it was very hard to keep them fresh, and free from dirt. Oil colors come now prepared for use in compressible tubes of thin metal and so do water colors also, although the latter are more generally used in cakes or in porcelain pans. Moist colors, so called, have been mixed with glycerine. They take water easily, flow readily, and are generally preferred to the dry cakes.

In the teaching of color to young children and in using paints and colored papers (supplementary to the matching of colors in wool, silk, and so on) it seems well to begin with the standard primaries. The children thus recognize a standard or normal color as the intense color —as the yellowish yellow, reddish red, or bluish blue. They may then learn tint and shade and combine only tints, standards and shades of the same color. In dealing with water colors the addition of water or white will give a tint, and black or gray added to the standard will give a shade. In the use of paper there is still some difficulty in getting the most desirable colors ; but this will be overcome doubtless when sufficient demand for harmonious combinations convinces the paper manufacturers of the need of care in reproducing an order exactly as it is given. In using water colors the paper which comes for the purpose is the best "Whatman's Rough" made into pads of convenient size ; but a clear white manila with a rough surface will do, especially for class exercises. Work covering a large area, as a broad treatment of historic

ornament or a decorative design, requires water-color paper stretched upon a drawing-board.

We all admit that the young child is greatly attracted by color but just how far or in what way we can safely use this love of color in education is the question. It would seem best that only in his first efforts should the child express ideas of form from nature with color, for then technical excellence is not expected. He may again use color from nature as a culmination of his powers of expression both in artistic spirit and technique, reached after many years drill in drawing, with a knowledge of the theory of color, and practice in light and shade. Color would be present in the intervening period, however, not only as a source of delight but as a means of education, first in the use of colored paper, and later in that of water colors for decorative design.

Any child can daub green paint on paper and call it a leaf, or red and call it a rose, but true art is not imitation, even though the daubing be clever for the child's age. However, some bright and enterprising teachers are experimenting in that direction, and it is interesting to watch the effect. All I have seen makes me doubtful of the safety of such effort (that is, painting from objects and nature) beyond the first or second year of school life until the high school is reached. The old masters required of themselves and their students long and rigid drill in drawing and in light and shade before color was touched, save in the study of theory and for use in decorative effects. The expression by color was the culmination of this long study.

There may be educational value in attempting the exact imitation of a leaf or flower from nature rendered in color closely imitating every little part and used for illustration in the study of botany; or color may aid in showing structure in other scientific studies such as physiology, or physics, but such work, valuable though it may be, is not art.

The answer which is constantly made to one who pleads for good methods and higher artistic development in our public schools is, that "the school is no place to make an artist." Neither is it the place to spoil one. We can however excite an interest in art, do something toward developing the general taste of the community (which possibility we may hope for through the children) if results in the way of technical excellence are not demanded before it is reasonable to look for them. In no other civilized country in the world has the subject of art education been considered of such minor importance as in the United States. Year after year has gone by and our manufacturers have employed only foreign designers. Young artists have found no proper training short of the foreign schools. A spirit of progress is among us. Art schools are springing up all over the land. Native talent is developing and being recognized. Let the teachers by doing their little and doing it well, help in this movement, which is great in its possibilities, requiring only zeal and effort to insure success. My plea is for the children of the masses ; that some feeling of beauty may enter their lives. It should be their inheritance. Who can measure its power for uplifting ?

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